

Applicant: Tapani Honkanen et al.
Application No.: 10/596,481
Response to Office action dated Sep. 15, 2008
Response filed Dec. 15, 2008

Claim Listing

- 1–16. (canceled)
17. (currently amended) An apparatus for axially oscillating a roll of a paper machine, comprising:
- a cradle mounted for linear motion and having a structure for attachment to the roll;
 - a first pair of eccentric masses rotatably mounted on the cradle, the first pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a first drive shaft;
 - a second pair of eccentric masses rotatably mounted on the cradle, the second pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a second drive shaft; and
 - a drive train, wherein the drive train comprises a motor; a first gear arranged to be driven by the motor, the first gear connected to the first drive shaft;
 - a second gear mounted about the second drive shaft, the second gear directly intermeshed with the first gear; and an adjustment element, arranged between the second gear and the second drive shaft, and operable to rotate the second drive shaft relative to the first drive shaft in order to change their mutual position and thus to create and adjust a phase difference between the first drive shaft and the second drive shaft.
18. (previously presented) The apparatus of Claim 17 further comprising:
- a first auxiliary shaft, wherein the first gear is connected to the first drive shaft by the first auxiliary shaft; and
 - a second auxiliary shaft forming a connection between the adjustment element and the second drive shaft.

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19. (previously presented) The apparatus of Claim 17, wherein the motor is an electric motor connected to the first drive shaft.

20. (previously presented) The apparatus of Claim 18, wherein the first gear is arranged on the first auxiliary shaft, and the second gear is arranged on the second auxiliary shaft with the adjustment element arranged between the second gear and the second auxiliary drive shaft.

21. (previously presented) The apparatus of Claim 17, wherein the drive train includes a drive device which is connected to operate the adjustment element to rotate the second drive shaft relative to the first drive shaft, and wherein the drive device is arranged to be self-returning to a initial position.

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22. (currently amended) An apparatus for axially oscillating a roll of a paper machine, comprising:
a cradle mounted for linear motion and having a structure for attachment to the roll;
a first pair of eccentric masses rotatably mounted on the cradle, the first pair of
eccentric masses being mutually synchronized and arranged to be driven in
rotation by a first drive shaft;
a second pair of eccentric masses rotatably mounted on the cradle, the second pair of
eccentric masses being mutually synchronized and arranged to be driven in
rotation by a second drive shaft; and
a drive train, wherein the drive train comprises a motor; a first gear arranged to be
driven by the motor, the first gear connected to the first drive shaft;
a second gear intermeshed with the first gear; and an adjustment element, arranged
between the second gear and the second drive shaft, and
operable to rotate the second drive shaft relative to the first
drive shaft in order to change their mutual position and thus to
create and adjust a phase difference between the first drive shaft
and the second drive shaft; and ~~The apparatus of Claim 17;~~
wherein the adjustment element is a sleeve mounted for axial movement relative to
the second drive shaft and the second gear.

23. (previously presented) The apparatus of Claim 22, wherein the sleeve transfers
a moment from the second drive shaft to the second gear, and wherein the sleeve comprises:
an inner surface with a first shape-locking construction with respect to the second
drive shaft; and
an outer surface with a second shape-locking construction with respect to the second
gear.

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24. (previously presented) The apparatus of Claim 23, wherein one of the first shape-locking construction or the second shape-locking construction comprises:
a first counter surface with spiral grooving; and
a second counter surface with a protrusion arranged according to the spiral grooving of the first counter surface.

25. (previously presented) The apparatus of Claim 23, wherein the outer surface of the adjustment element and the inner surface of the second gear have straight grooving.

26. (previously presented) The apparatus of Claim 22, wherein the sleeve has an inner surface on which is formed a spiral grooving, in which spiral grooving a protrusion arranged on the second drive shaft travels.

27. (previously presented) The apparatus of Claim 26, wherein there are two opposed spiral grooves on the inner surface of the sleeve, and two corresponding protrusions fitted to the second drive shaft or an auxiliary shaft connected to the second drive shaft.

28. (previously presented) The apparatus of Claim 19, further comprising a circulating lubrication system comprising:
a lubricant feed pump; and
a control system, wherein the motor is arranged to act as a generator for rotating the lubricant feed pump in the case of a power outage.

29. (previously presented) The apparatus of Claim 18, wherein the first gear, the second gear, the first auxiliary shaft, and the second auxiliary shaft are supported on a common and essentially rigid bearing stand.

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30. (currently amended) An apparatus for axially oscillating a roll of a paper machine, comprising:

a cradle mounted for linear motion and having a structure for attachment to the roll;

a first pair of eccentric masses rotatably mounted on the cradle, the first pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a first drive shaft;

a second pair of eccentric masses rotatably mounted on the cradle, the second pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a second drive shaft; and

a drive train, wherein the drive train comprises a motor; a first gear arranged to be driven by the motor, the first gear connected to the first drive shaft; a second gear intermeshed with the first gear; and an adjustment element, arranged between the second gear and the second drive shaft, and operable to rotate the second drive shaft relative to the first drive shaft in order to change their mutual position and thus to create and adjust a phase difference between the first drive shaft and the second drive shaft;

wherein the drive train includes a drive device which is connected to operate the adjustment element to rotate the second drive shaft relative to the first drive shaft, and wherein the drive device is arranged to be self-returning to a initial position; and ~~The apparatus of Claim 21,~~

wherein the adjustment element and the drive device are fitted inside the second gear.

31. (previously presented) The apparatus of Claim 30, wherein the drive device further comprises bearings and a shaft which is arranged as a continuation of the second drive shaft.

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32. (previously presented) The apparatus of Claim 30, wherein the drive device includes a pressure-medium connection permitting the rotational motion of the drive device while the second gear rotates.

33. (canceled)

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34. (currently amended) An apparatus for axially oscillating a roll of a paper machine, the apparatus comprising:

a cradle mounted for linear motion and having a structure for attachment to the roll;

a first pair of eccentric masses rotatably mounted on the cradle, the first pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a first drive shaft;

a second pair of eccentric masses rotatably mounted on the cradle, the second pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a second drive shaft; and

a drive train comprising first and second intermeshing gears driven by a motor, wherein the first drive shaft is driven by said first intermeshing gear or said first intermeshing gear is driven by the first drive shaft, and wherein the second drive shaft is driven by said second intermeshing gear through an adjustment element, the adjustment element operable to rotate the second drive shaft relative to the first drive shaft in order to change their mutual position and thus to create and adjust a phase difference between the first drive shaft and the second drive shaft; and ~~The apparatus of Claim 33,~~

wherein the adjustment element is a sleeve structured to transmit moment from the second intermeshing gear to the second drive shaft, which sleeve is mounted for axial movement relative to the second drive shaft and the second intermeshing gear, and arranged so that the axial motion of the sleeve causes rotation of the second drive shaft with respect to the second intermeshing gear to create the phase difference between the first drive shaft and the second drive shaft.

35. (canceled)

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36. (currently amended) An apparatus for axially oscillating a roll of a paper machine, the apparatus comprising:
a cradle mounted for linear motion and attachment to the roll to cause axial oscillation of the roll;
a first pair of eccentric masses rotatably mounted on the cradle, the first pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a first drive shaft;
a second pair of eccentric masses rotatably mounted on the cradle, the second pair of eccentric masses being mutually synchronized and arranged to be driven in rotation by a second drive shaft;
a motor;
wherein the first drive shaft and a first gear mounted to the first drive shaft are driven by the motor; and
a second gear driven by the first gear, wherein the second drive shaft is driven by said second gear through an adjustment element, the adjustment element operable to rotate the second drive shaft relative to the first drive shaft in order to change their mutual position and thus to adjust a phase difference between the first drive shaft and the second drive shaft; and ~~The apparatus of Claim 35~~
wherein the adjustment element is a sleeve structured to transmit moment from the second gear to the second shaft, which sleeve is mounted for axial movement relative to the second drive shaft and the second gear, and arranged so that the axial motion of the sleeve causes rotation of the second shaft with respect to the second gear, to create the phase difference between the first drive shaft and the second drive shaft.